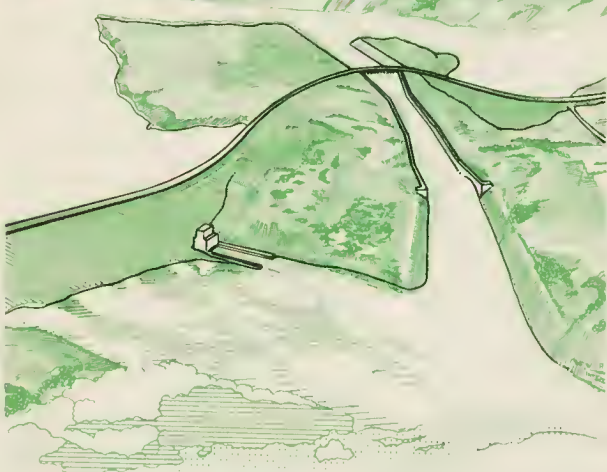


# CANADA

• DEPARTMENT OF AGRICULTURE •

PRAIRIE FARM REHABILITATION  
ADMINISTRATION

## The South Saskatchewan River Dam



HON. DOUGLAS S. HARKNESS

*Minister*



QU'APPELLE VALLEY DAM

HUDSON'S BAY COULEE

COTEAU CREEK

SPILLWAY

IRRIGATION CANAL

IRRIGATION CANAL

W.E.R.

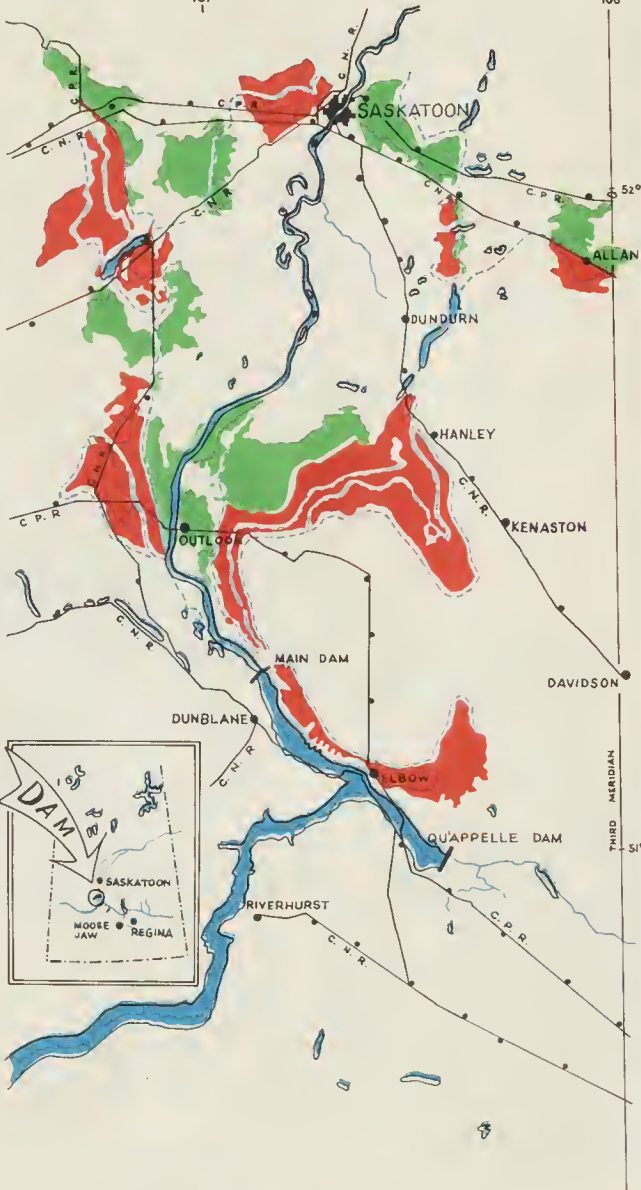




# SOUTH SASKATCHEWAN RIVER DEVELOPMENT PROJECT IRRIGABLE LANDS

107°

106°



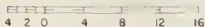
## LEGEND

### IRRIGATION

GRAVITY  
PUMPED  
CANALS



Scale in Miles



## IRRIGATION

One of the principal uses of this project will be for irrigation. About 500,000 acres of good soil can be irrigated including approximately 30,000 acres of land in the Qu'Appelle Valley.

In order to determine problems which might arise when irrigation is introduced into the area, and to select irrigation techniques and practices best adapted to soil and climatic conditions on the project, the Federal Government established a pre-development farm near Outlook in 1950. The development area is divided into two parts. One part, approximately 16 acres in size, is operated by the Experimental Farm at Swift Current where detailed experimental work is being conducted on irrigated crops and soils. The other part of the farm, 155 acres in size, is operated by P. F. R. A. to demonstrate on a field scale, farming practices and irrigation methods recommended for the area. The history of irrigation elsewhere would indicate that emphasis should be placed on livestock production and the growing of such crops as would benefit a livestock economy. Trials being conducted on the pre-development farm tend to bear out these conclusions.

## HYDRO-ELECTRIC POWER

One of the most immediate benefits which can be derived from the construction of the South Saskatchewan Dam will be the power which can be produced by the generating station at the damsite. With an estimated 69 per cent of the population located within a radius of 150 miles of the dam, the generating plant will be ideally located to fit into the existing power distribution system.

After full upstream development of the river basin is accomplished, it is calculated that the power station will be able to produce approximately 475,000,000 kwh. annually. Of this, 50,000,000 kwh. will be required for irrigation pumping when the irrigation system is fully developed. The balance would be available for other uses.

## URBAN WATER SUPPLY

A portion of the water supply required by the Cities of Moose Jaw and Regina is derived from Buffalo Pound Lake in the Qu'Appelle Valley. The Government of Canada has agreed to maintain adequate levels in this lake for this purpose, by pumping from the South Saskatchewan River. The new dam will mean that these needs can be met by gravity flow, thus eliminating the cost of pumping.

Serving other urban centres in the area is also well within the realm of possibility particularly as these centres continue to grow and the demand for more dependable and elaborate water supply systems increases.



**SOUTH SASKATCHEWAN  
RIVER DAMSITE**

## RIVER REGULATION AND FLOOD CONTROL

The wide variation of seasonal flow of the South Saskatchewan River has made power development impractical without large storage facilities. The reservoir as planned, would provide almost complete regulation of the river flow and would increase the power potential of five possible power sites farther downstream.

The Pike Lake area in the vicinity of Saskatoon and the Carrot River area near The Pas in Manitoba have been subject to flooding in the past. The creation of the South Saskatchewan River Reservoir will help to reduce the flood hazard in these areas.



## RECREATION

Construction of the dam on the South Saskatchewan River will also have important implications for recreation. The dam will create an immense inland lake of the South Saskatchewan River Valley extending 140



miles upstream almost to the Alberta border providing 475 miles of shoreline on which recreational facilities can be developed. It will also make it possible to divert

water by gravity into the Qu'Appelle Valley, which will greatly enhance the recreational facilities already available on Last Mountain Lake and on the six lakes in the Qu'Appelle Valley. These bodies of water tend to recede and become stagnant during dry periods. New opportunities for hunting . . . fishing . . . swimming . . . boating . . . picnicking . . . and camping will thus be opened up within easy driving distance for at least two-thirds of the population in the province.

Fish in the main reservoir will be mainly pike, pickerel, and gold eye which normally inhabit the South Saskatchewan River, as well as the lakes in and adjoining the Qu'Appelle Valley. In both areas the fish populations should thrive with improved water levels. Similarly, bird populations should grow, particularly migratory birds, because of improved nesting conditions around the lakes. Irrigation will encourage pheasant populations; at least this has been the experience in the irrigation districts in Alberta and the Dakotas.



# THE DAM

The dam will be the largest rolled-earth fill of its kind in Canada and will rank as one of the larger rolled-earth fills of its type in the world. It will rise above the present floor of the river 210 feet and stretch across the river valley for a distance of almost 3 miles.

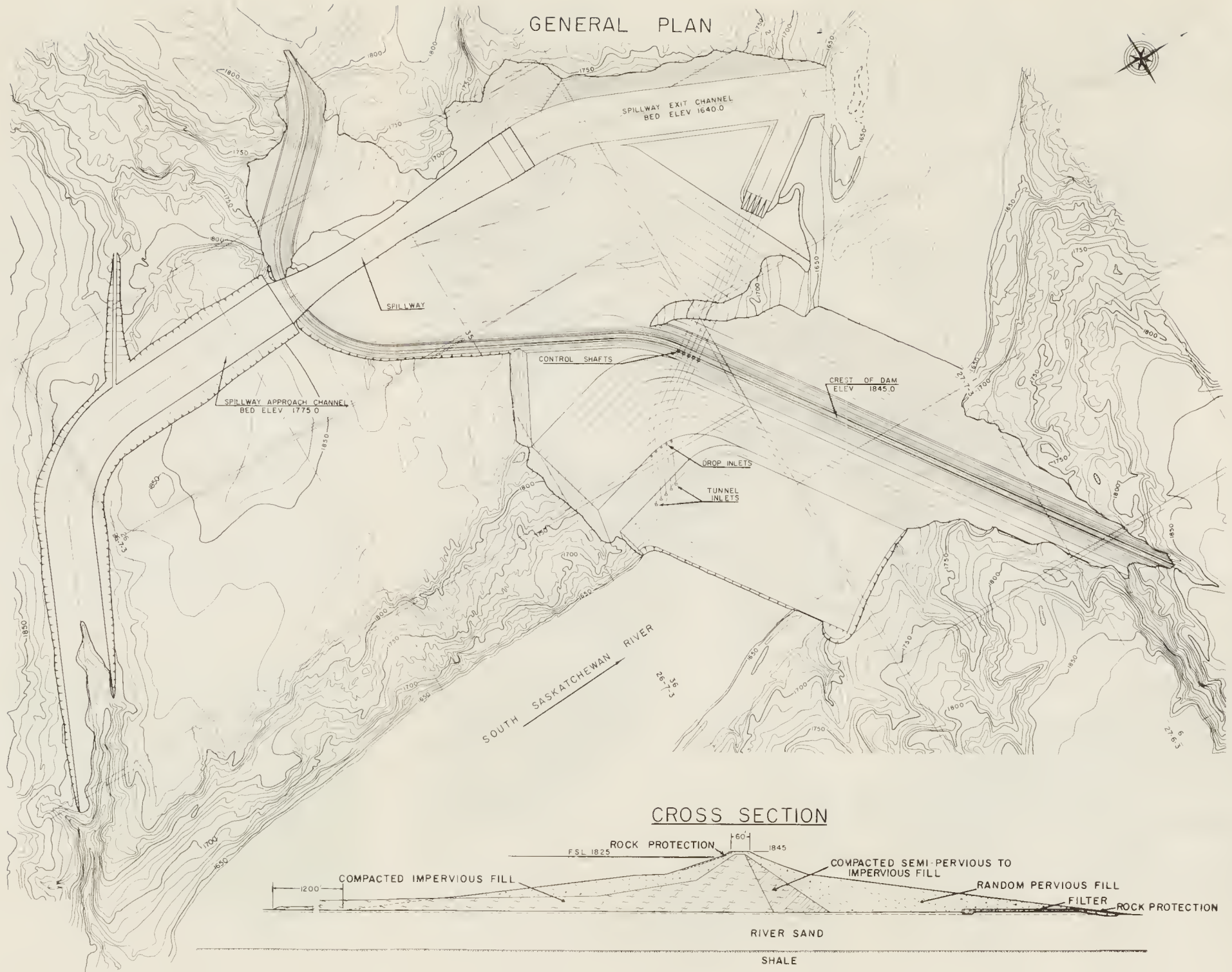
Viewed in cross section the embankment appears triangular in shape; 60 feet wide at its top and 2600 feet wide at its base. An earth blanket varying from 10 to 34 feet in thickness will extend 1200 feet upstream from the toe of the dam over the river bottom to prevent water leaking under the structure from the reservoir. Slopes on both sides of the embankment will vary from  $26^{\circ}$  at the top of the dam to  $7^{\circ}$  at the bottom. The upper 40 feet of the slope facing the reservoir will be covered with rock for protection against wave action. A granular filter under the downstream section of the dam will provide proper drainage for foundations and embankment. The central section or core will consist of dense watertight material to seal off and hold back the waters in the reservoir. A highway will be provided over the dam.

Associated with the dam will be diversion works which will be used to contain the flow of the River while the main fill is under construction. These will be tunnels. Tentative plans are to build five, twenty feet in diameter and averaging 4,050 feet in length. The tunnels will be constructed in the bedrock formation through the west abutment of the dam and will be lined with reinforced concrete. After the dam has been completed these tunnels will be converted so that they can be used to deliver water to the power generating station and to regulate water flows in the river below the dam.

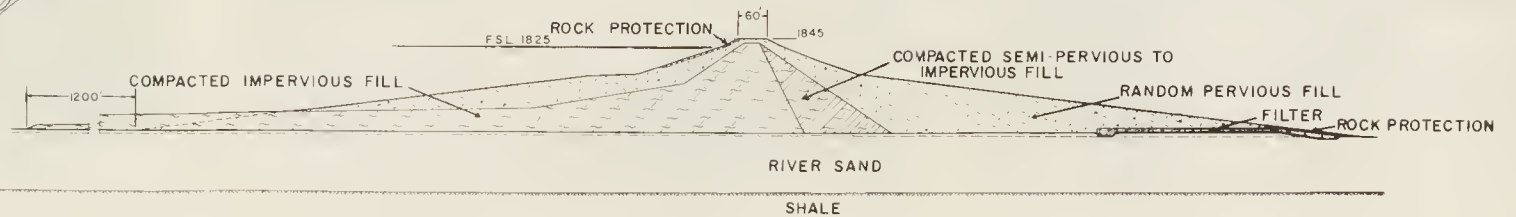
The spillway will be located southwest of the main fill about a mile away from the west abutment. This will be gated and of reinforced concrete construction. The location utilizes a natural depression created by Coteau Creek which flows into the South Saskatchewan River just below the main fill. The over-all length of the spillway will be 17,000 feet of which 8,000 feet will be approach channel, 3,000 feet the concrete control structure, and 6,000 feet exit channel. The spillway will have a discharge



# GENERAL PLAN



## CROSS SECTION



capacity of 265,000 cubic feet of water per second or sufficient to take care of any future flood condition that might be expected to occur in the river.

Finally, an auxiliary earth dam will be built at the divide between the Qu'Appelle Valley and Aiktow Creek which flows into the South Saskatchewan River, to control the flow of water from the main reservoir into the Qu'Appelle Valley. Water in the main reservoir at this point will stand about 70 feet deep at full supply level. Control will involve the building of a dam 90 feet high, 9,000 feet long and 700 feet wide at its base.

## THE RIVER

The South Saskatchewan River receives most of its water from eight major tributaries, with a combined drainage area of approximately 48,800 sq. miles, which rise on the eastern slope of the Rocky Mountains in the Province of Alberta and the State of Montana. Its actual starting point is where the Old Man River with its tributaries, the St. Mary, Belly and Waterton, and the Bow River with its tributaries, the Highwood and Elbow, flow together midway between the Cities of Lethbridge and Medicine Hat in southern Alberta. The Red Deer River joins the main stream at the Alberta-Saskatchewan boundary near Empress. From the boundary the River flows in an easterly direction through southern Saskatchewan to Elbow, where it turns north through the City of Saskatoon to the junction with the North Saskatchewan River, 30 miles east of the City of Prince Albert. From here it again flows in an easterly direction until it empties into Lake Winnipeg in Manitoba and eventually, Hudson Bay.

Through the plains region, the South Saskatchewan River flows through a deeply entrenched valley with a relatively flat gradient. The depth of the Valley has been the main deterrent to development in the past, making it economically impractical to construct high dams for any single purpose. Only by having a combination of uses can such an immense undertaking be contemplated. In such a case, the deep valley and flat gradient has the advantage of being able to provide a very large amount of storage which is essential because of the extreme variability in the flow of the River.

The Prairie Provinces Water Board which studies the water interests of all the Prairie Provinces on such interprovincial streams, has approved the allcation of water from the River for the South Saskatchewan Project.

## INTRODUCTION

On Friday, July 25th, 1958 the government of Canada signed the agreement previously ratified by the government of Saskatchewan, which authorizes the commencement of construction work on the South Saskatchewan River Project a large-scale multi-purpose water conservation project proposed for development in South Central Saskatchewan. The purpose of the project will be to make better use of the water resources in the River through irrigation, river control, power, urban water supply, and recreation. Control of the river will be achieved by two dams, the major one on the river itself at a point approximately half way between the towns of Outlook and Elbow in Saskatchewan, the other at the divide between the valleys of the South Saskatchewan and the Qu'Appelle. The agreement provides that Canada and Saskatchewan will share the cost of building the above structures and all other works associated with the creation of the reservoir, seventy-five per cent to be borne by Canada and twenty-five per cent to be borne by Saskatchewan with the share of cost to be borne by Saskatchewan not to exceed \$25,000,000. The contribution of the government of Canada toward the cost of the project is in accord with its long range resources development plan to provide for expansion and stability in Canada's growing economy.

## HISTORY

The first reference to the possibility of developing a dam of the South Saskatchewan River was made by Prof. N. Y. Hind, a famous explorer who visited the region in 1858. Prof. Hind envisaged the construction of a dam which would divert the flow of the South Saskatchewan down the Qu'Appelle Valley and thus create a navigable route joining the Assiniboine with the South Saskatchewan River.

Again around the turn of the present century, the Cities of Regina and Moose Jaw, which were then beginning to experience water shortage problems, proposed the construction of a dam on the South Saskatchewan River near Elbow, that would divert



river water down into the Qu'Appelle Valley to Buffalo Pound Lake to augment their water supply, and provide a source of water supply for other rural communities and urban centres in the region. The plan proved somewhat more expensive than anticipated however, and was eventually dropped although it is worthy of note that certain rights to the use of South Saskatchewan River water were actually secured by the City of Regina in 1912 in prospects of such a scheme being developed.

Investigations which have been carried out by P. F. R. A. in connection with the present scheme were begun in 1943. The main interest of the Government of Canada in the scheme was to provide greater stability for agriculture in central Saskatchewan where prolonged droughts have, in the past, created serious problems for the tens of thousands of farmers in that region.

Sites were investigated by P. F. R. A. throughout a 100 mile stretch of river from Outlook to a point north of Swift Current. Ten possible sites along this stretch of the river were given special consideration, and a point 18 miles above Outlook was finally selected.

Foundation conditions have dictated that an earth-fill dam is the only feasible type of structure to use on this stretch of the South Saskatchewan River. Topography and location of materials led to the selection of the proposed site.

## THE RESERVOIR

The reservoir created by the construction of the dam will impound 8,000,000 acre feet of water, or enough to cover 8,000,000 acres to a depth of one foot. It will be 140 miles long, 185 feet deep at the dam and will have a shoreline of 475 miles. The flooded area at full supply level will be approximately 109,600 acres, 5.2% of which is now under cultivation. The remaining land is immediately adjacent to the river and has little agricultural value other than for grazing.

The Queen's Printer and Controller of Stationery  
Ottawa, 1960

Cat. No. A22-460

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## PROJECT STATISTICS

### *South Sask. River Dam*

Height.....	210 feet
Length—overall.....	16,700 feet
Length—main fill.....	8,000 feet
Width at base (including upstream blanket)....	3,800 feet
Val. of embankment.....	40,000,000 cu. yds.
Val. of excavation.....	52,000,000 cu. yds.
Val. of concrete.....	531,000 cu. yds.
Val. of rip-rap.....	750,000 cu. yds.
Construction period.....	6-8 years

### *Spillway*

Type—Gate controlled concrete chute	
Length of chute.....	17,000 feet
Length of crest.....	528 feet
Discharge capacity.....	265,000 c.f.s.

### *Diversion Works*

Type.....	Tunnels
Na. of tunnels.....	5
Average length.....	4,050 feet
Size of tunnels.....	20 ft. dia.

### *Reservoir*

Area.....	109,600 acres
Total storage.....	8,000,000 ac. ft.
Usable storage.....	2,750,000 ac. ft.
Length of shoreline.....	475 miles
Length of reservoir.....	140 miles
Depth of water at dam....	185 feet

### *Qu'Appelle River Dam*

Height.....	90 feet
Length.....	9,000 feet
Width at base.....	700 feet
Val. of embankment.....	7,500,000 cu. yds.

### *Drainage Basin*

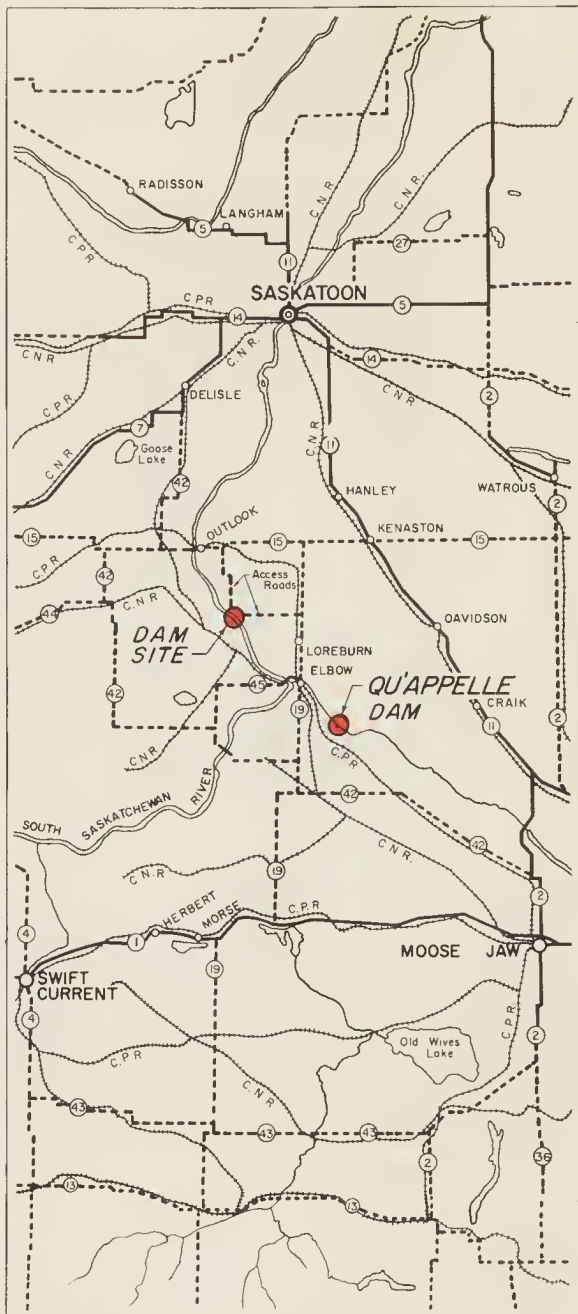
Total far river.....	65,500 sq. mi.
Above damsite.....	48,800 sq. mi.

IRRIGABLE AREA..... 500,000 acres

### *Power*

Average annual output.... 475,000,000 kwh.

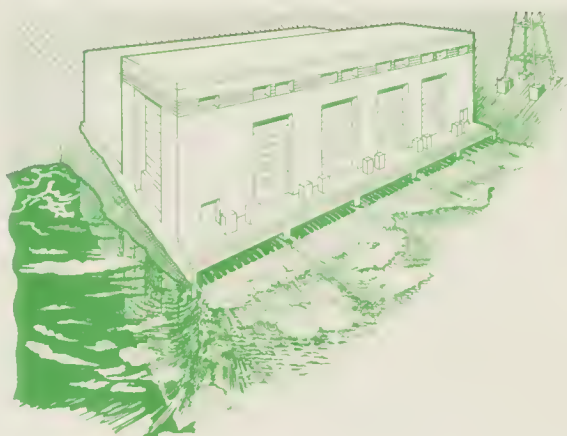
# LOCATION MAP





## THE PURPOSE

1. Stabilize agriculture in the region through irrigation and provision of more dependable water supplies.
2. Provide hydro-electric power.
3. Provide a more abundant supply of good water for domestic and industrial purposes.
4. Reduce flood hazards on the River through better regulation.
5. Create greater facilities for recreation and other amenities of pleasurable living.



# SOUTH SASKATCHEWAN RIVER DAM HIGHLIGHTS

1. The South Saskatchewan River Dam will be the largest rolled-earth dam ever built in Canada and one of the larger dams of its kind in the world.
2. The amount of excavation required to build the dam would make a hole in the ground a city block square  $1\frac{1}{2}$  miles deep.
3. The dam will rise above the bed of the River 210 feet, or equivalent in height to a 17 storey office building.
4. Enough steel will be used in the dam to make a  $3/8$ " steel rod long enough to stretch around the earth.
5. The cement needed would fill to capacity 3,000 freight cars.
6. The concrete used would build a 2 lane super highway from Regina to Prince Albert in Saskatchewan a distance of approximately 225 miles.
7. The diversion tunnels will be large enough for trains to pass through.

